ON A NEW FORM OF HETERONYMPHA PENELOPE WATERHOUSE (LEPIDOPTERA RHOPALOCERA, FAMILY SATYRIDAE)

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SUMMARY

A description is given of a new race, *Heteronympha penelope maraia* from the Grampian Mountains, western Victoria. *H. p. panope* is recorded from altitudes of 2,400 - 3,800 feet on Mount Barrow in the north-eastern highlands of Tasmania. There is a discussion on the possible climatic significance of the development in isolation of six different races of this butterfly in south-eastern Australia and Tasmania.

HETERONYMPHA PENELOPE Waterhouse

Visiting Tasmania in January and February 1948 I took a long series of *Heteronympha penelope panope* Waterhouse, of both sexes, on Mount Barrow in north-eastern Tasmania, at elevations of 2,400 - 3,800 feet, on 9 February. They were flying in natural grassy meadows just below a belt of Antarctic beech forest on the north-eastern slope of the mountain, also above it; all were freshly-emerged specimens. In November 1950 some *H. penelope* larvae were taken, feeding at night on soft native grasses, *Poa caespitosa* and *Danthonia pilosa*, on the banks of Fyans Creek, Grampians, western Victoria. When reared they proved to be a new form of this butterfly.

These finds drew my renewed attention to the species, which, as Waterhouse (1937) had already realised, shows considerable variation in form and markings, in the several isolated areas in which it occurs.

The following races previously have been described, all by G. A. Waterhouse:—

(1) *Heteronympha penelope penelope* Waterhouse 1937. From New South Wales at Barrington Tops, in January and February, also from Stonehenge, Ebor (4,800 feet), the Blue Mountains, Moss Vale, and on Mount Kosciusko at 5,000 feet, in February. The type locality is at Barrington Tops.

(2) *Heteronympha penelope sterope* Waterhouse 1937. From Gisborne and Fern Tree Gully, eastern Victoria, flying from January to March.

(3) *Heteronympha penelope alope* Waterhouse 1937. Lorne, Victoria, in February and March.

(4) *Heteronympha penelope diemeni* Waterhouse 1937. The holotype is from New Norfolk near Hobart in February; it is known also from above Hobart, on the slopes of Mount Wellington (at elevations up to 1,000 feet), at Dunally, and on Maria Island. Waterhouse also placed here a female from Launceston (February) and a worn pair taken at Burnie. There are in the South Australian Museum collection several specimens, labelled (Launceston, F. M. Littler), including one taken in March.

(5) *Heteronympha penelope panope* Waterhouse 1937. Cradle Mountain, western Tasmania (2,000 feet), at Derwent Bridge near Lake St. Clair and Mount Magnet (in January). Only the male is so far described; Mr. L. Couchman has in preparation a detailed study of dates of capture and localities in Tasmania.

* South Australian Museum.

Heteronympha penelope maraia subsp. nov.
Plate II

Male—Forewings black, with rich orange-brown markings; a large ocellus below apex partly surrounded above by orange-brown, and with an orange-brown spot below it; a large similarly coloured patch in upper half of cell, broadly connected to another orange-brown patch extending nearly to inner margin and to base of wing; the latter is partly divided by a thin black band at about one-half; sex scales in cell grey, with a prominent black spot defining their distal limit. Hindwing broadly orange-brown, with a large ocellus near inner angle and a small black spot below costa representing a vestige of a subapical one, without defined centre; a very limited black area in centre of wing. Forewings beneath with pattern of markings as above, but with apical fifth of wing chocolate-brown, ocellus with a double ring and light areas pale orange, lighter towards costa; cell orange, with a conspicuous black circular patch at one-half, and an angled black patch partly margining apex of cell. Hindwings pale chocolate-brown with a broad outer chocolate margined area possessing a purple sheen and connecting the two eye-spots; the subapical eye-spot small, one at inner angle relatively large. Expanse 60 mm.

Female—Similar to male, but with outer margin straighter and inner angle of hindwing more acute; base of wings infuscated with patches of dark scales, obscured by long hairs, so as to appear grey; brown area above subapical ocellus of forewing conspicuously dark; subapical ocellus of hindwing with traces of a white centre; wings below slightly paler than in male and patch below subapical ocellus of forewing almost white. Expanse 67 mm.

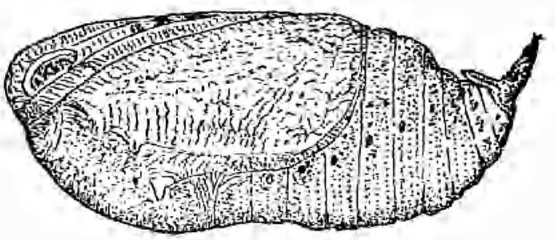

Fig. 1

Locality—Western Victoria; Fyans Creek, Grampian Mountains (800 ft.). Holotype a male, emerged 26 January 1951, and allotype female, emerged 30 January 1951 (I. 19088 in S.A.M.), collected and presented by N. B. Tindale, also a paratype male, emerged 25 January 1951, and 5 males and 4 females from there and from Mount Rosea, January-February 1952. The name suggested for the race is based on the aboriginal word "Maraia," a Marditjali tribe name for the Grampian Mountains.

This race differs from the others of the species in the great extent of the rich brown colour of the wings, in both sexes, and the relative absence of dark infuscations on the hindwings above. In its wing markings it is nearest to *H. p. sterope*, sharing with most examples of that form the interconnected orange-brown areas of upper cell and tornal regions. It differs in detail of markings. The tips to forewings beneath, and hindwings, instead of the relatively pale ochreous colour characteristic of the Eastern Victorian race, are rich brown.

In *H. p. maraia* the brown of the ground colour in the female is almost as dark as in the male, whereas in *H. p. sterope*, as also in *H. p. diemeni*, the female is by far the paler of the two.

From *H. p. alope* and *H. p. panope* it differs in its relatively larger size, and in having the spot immediately below the subapical ocellus of the forewing

above, deep orange-brown in both sexes, instead of pale brown in the male, and white in the female as in these often smaller forms. It also differs in having a single small subapical eye-spot on the hindwing, almost devoid of white centre, instead of the biocellate subapical condition usual in the Tasmanian form. In this character it resembles *H. p. alope*.

Life-history—Eggs and larvae have been examined and agree with Waterhouse's description of those of the eastern races. The pupa (fig 1) is 17 mm. in length, robust, pale brown in colour. Some pupae have dark spots and blotches. Pupation takes place among a few strands of loose silk, embracing leaves. The pupa figured, that of the allotype female, emerged after an interval of 41 days.

KEY FOR THE SEPARATION OF RACES OF HETERONYMPHA PENELOPE

1	Size large (60 mm. or over)		2
	Size small (below 55 mm.)		5
2	Orange spot in cell of forewing connected with that of dorsum		3
	Orange spot in cell of forewing not connected with that of dorsum		4
3.	Tip of forewing beneath brown	*maraia*	
	Tip of forewing beneath pale ochreous	*sterope*	
4	Wings strongly angulate	*penelope*	
	Wings somewhat rounded	*diemeni*	
5	Hindwings uniocellate	*alope* (male)	
	Hindwings biocellate		6
	Hindwings triocellate	*panope* (most)	
6	Wings with dark markings dominant	*panope*	
	Wings with ochreous markings dominant	*alope* (female)	

NOTE—The above key is intended to separate all but an occasional variant. Some *H. p. sterope* have the discoidal spot partly divided from that of dorsum by a few dark scales. Mr. L. Couchman tells me he has specimens of *H. p. alope* much larger than here indicated, and that, in a long series, *H. p. alope* appears to intergrade with *H. p. sterope*. Such large *H. p. alope* specimens will, in this key, fall out with *H. p. sterope*.

DISCUSSION ON THE FORMS OF HETERONYMPHA PENELOPE

It seems possible that *H. p. panope* and *H. p. alope* form a natural group of slightly smaller races with well-rounded wings in both sexes, while the *H. penelope* series, *penelope, sterope, diemeni* and *maraia* comprise generally larger forms with more angular wings; the last-named character is especially noticeable in the females, and least evident in the males of *diemeni*.

At first it was thought that the *panope* and *penelope* series might be two separate species, but this appears not to be the case.

H. p. panope, in general, tends to be a mountain form in northern Tasmania, appearing for a brief season in January and early February at rather high elevations. On Mount Barrow it appears abundantly just below an Antarctic beech forest zone; and also up beyond it to the bare rock slopes at 3,800 feet. It also occurs in the uplands of western Tasmania, where it breeds at elevations of over 2,000 feet.

On the broad lowland belt between these two highland areas and extending across the somewhat drier and relatively low midland region of Tasmania from Launceston to Hobart, as well as on islands such as Maria Island, occurs the larger, more angular-winged *H. p. diemeni* which emerges in late January, February and early March; this form is rather closely related to *H. p. sterope* of the foothills of Eastern Victoria.

H. p. alope of the Lorne area seems to be the mainland representative of the *panope* series, but this tentative conclusion may be modified when more material is available from the Lorne district.

The presence in Tasmania of a mountain form, *panope*, occupying two separate areas, formerly completely glaciated, with a different race, *diemeni*, in the always unglaciated country of the broad, generally lowland belt, in between, opens up interesting avenues for speculation on the possible late Pleistocene and Recent history of the species in south-eastern Australia.

Judging from present-day capacities of *panope* larvae to resist cold it is possible that the late Pleistocene ancestor of the *panope* form was able, during the Wurm (Last) Glaciation to maintain its footing either in the area of the present northern Tasmanian lowlands, or at least in the lowlands now under the ocean, of which King Island is a relic. Perhaps the capacity of this ancestral form to resist cold may have been brought about by gene selection during the onset of that or earlier glacial episodes.

As climate began to ameliorate in Recent time the ancestral *panope* began slowly to recolonise the Eastern and Western Highlands, and, except in the south, eventually perhaps abandoned the warmer lowlands in between as these became too mild or otherwise unsuitable. Thereafter eastern and western population of *H. p. panope* perhaps developed in isolation from each other. If so, the interval of time since they became separated has not been great enough to cause them to become greatly differentiated. It has not been possible to find consistent characters to separate them.

Perhaps later than the postulated separation of the two *panope* populations, the large and rather different Victorian ancestor of *sterope* found its way south to Tasmania, following the extension southwards of the warmer climatic belt. Since this form may have become, or remained adjusted to a warmer climatic range than ancestral *panope* it came to breed in, and occupy, the lowlands of Tasmania.

As Tasmania became cut off by the Post-Glacial rise in sea-level it has been differentiated a little from the Victorian *sterope*, and today appears as the large form *diemeni*.

Only in some such way does it seem possible to account for the presence of two separate races of *H. penelope* in Tasmania.

The presumptively lowland and highland breeding forms seem to have remained isolated from each other and to have been sufficiently free of recent gene exchange to have maintained characteristic appearances.

There is a possibility that *panope* may appear a little earlier than *diemeni*. The insects fly at a period of the year of maximum warmth and dryness, considering the relatively wet environment of Tasmania. They are not far-ranging forms and probably do not fly far from the natural banks and meadows in which they breed.

When more intensive collecting is done, however, it may be found that at a few places there have arisen natural hybrid populations, *panope* x *diemeni* after the manner of the natural hybrid *Tisiphone abeona joanna* reported by Waterhouse (1928) in northern New South Wales. In such a case it would not be surprising to find a very variable local population, similar to that which was established to be of hybrid origin by the breeding experiments made by Waterhouse on neighbouring races of *Tisiphone abeona*.

It was at first thought that the eastern and western *panope* populations might be distinguishable, but examination of the very long series taken on Mount Barrow and of the majority of the known specimens from the western highlands convinced me they cannot be separated, for, unlike most of the other established races, it does not seem possible to find any character sufficiently different and stable to enable them to be keyed apart.

Either the rigid selection which enabled *panope* to survive in its cold environment has restricted its genetic plasticity, as compared with mainland races, or the

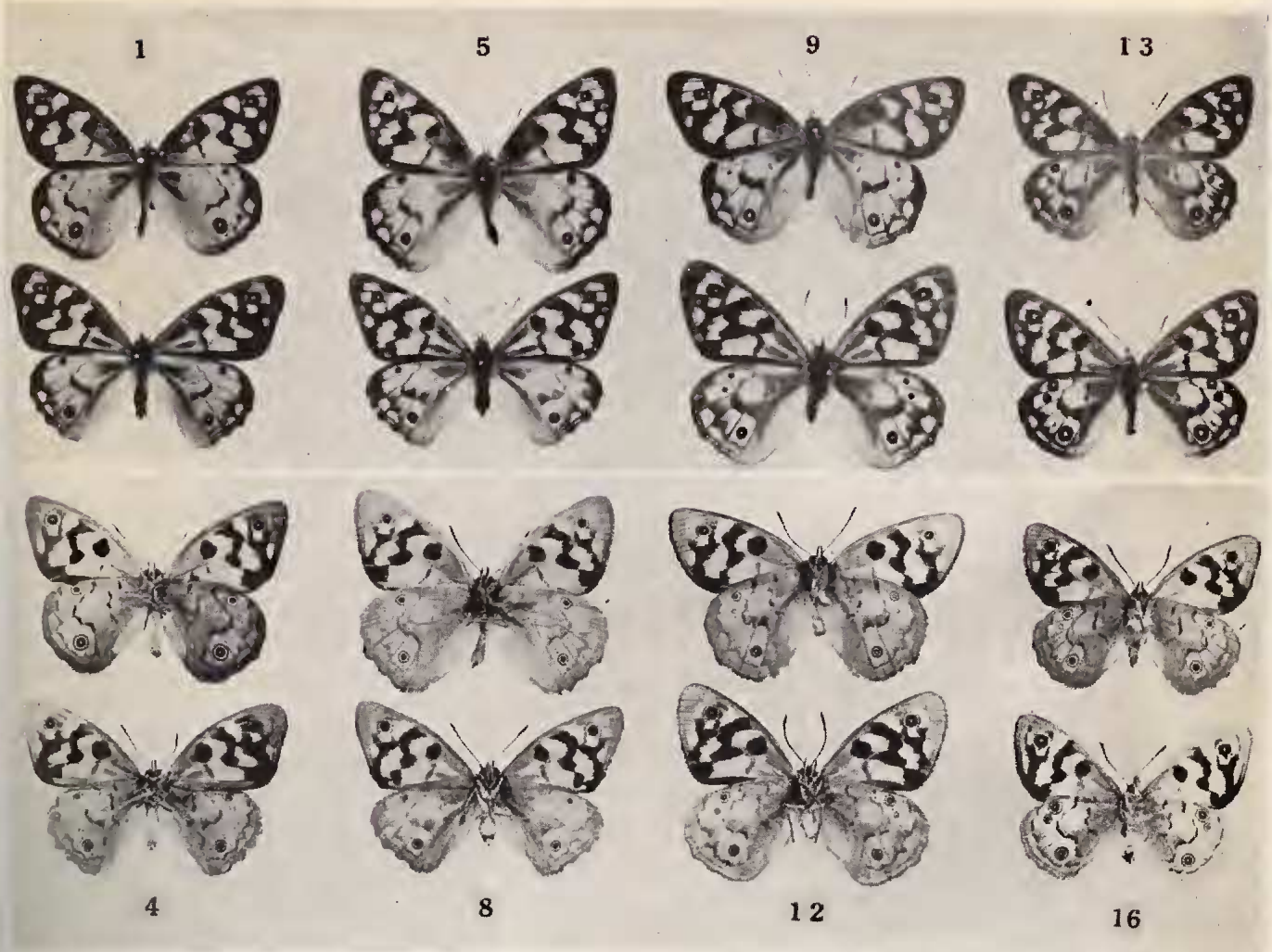

Fig. 1-16 *Heteronympha* penelope Waterhouse (x $\frac{2}{3}$ nat. size)

Fig. 1 *H. p. maraia* Tindale, male, upper surface, Fyans Creek, Victoria
Fig. 2 „ „ „ „ female, upper surface, Fyans Creek, Victoria
Fig. 3 „ „ „ „ male, lower surface, Fyans Creek, Victoria
Fig. 4 „ „ „ „ female, lower surface, Fyans Creek, Victoria
Fig. 5 *H. p. sterope* Waterhouse, male, upper surface, Fern Tree Gully, Victoria
Fig. 6 „ „ „ „ female, upper surface, Gisborne District, Victoria
Fig. 7 „ „ „ „ male, lower surface, Fern Tree Gully, Victoria
Fig. 8 „ „ „ „ female, lower surface, Gisborne District, Victoria
Fig. 9 *H. p. diemeni* „ male, upper surface, Launceston, Tasmania
Fig. 10 „ „ „ „ female, upper surface, Launceston, Tasmania
Fig. 11 „ „ „ „ male, lower surface, Launceston, Tasmania
Fig. 12 „ „ „ „ female, lower surface, Launceston, Tasmania
Fig. 13 *H. p. panope* „ male, upper surface, Mt. Barrow (3,800 ft.), Tas.
Fig. 14 „ „ „ „ female, upper surface, Mt. Barrow (2,475 ft.), Tas.
Fig. 15 „ „ „ „ male, lower surface, Mt. Barrow (3,800 ft.), Tas.
Fig. 16 „ „ „ „ female, lower surface, Mt. Barrow (2,475 ft.), Tas.